

FINAL REPORT

Limited Scope Indoor Air Quality Survey SSMC III

for

National Oceanic & Atmospheric Administration

**Sampling Conducted at Building SSMC-3
On February 29-March 3, 2000**

Interagency Agreement #: D8H00CO36100

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Executive Summary

At the request of the National Oceanic & Atmospheric Administration (NOAA), Federal Occupational Health (FOH) collected indoor air quality measurements for temperature, relative humidity, carbon dioxide, carbon monoxide, and airborne fungal spores throughout Building SSMC-3, located at 1315

East-West Highway, Silver Spring, Maryland. Measurements were taken over a three day period from February 29 through March 2, 2000 following the methodology described below.

Temperatures throughout the building over the time period measured ranged from 66-77 °F. . The fitness center was the only location with temperatures below 68°F. Indoor relative humidity ranged from 19-27%, except for the fitness center with relative humidity in the range of 28-37%.

Current guidelines of the American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE) Standard 55-1995 (Thermal Environmental Conditions for Human Occupancy) recommend temperatures in the range of 68-75°F in winter season and 73-79°F summer season, along with maintaining 30 - 60% relative humidity. These ranges are based on a 10% dissatisfaction criterion.

Building temperatures were generally within the ASHRAE recommended range. Relative humidity was consistently below 30%.

In general, carbon dioxide measurements provide an indicator of available “fresh air” in the space. Current standards describe indoor carbon dioxide levels below 850 ppm (AIHA), or 1000 ppm (ASHRAE 62-1999) as generally acceptable. Carbon dioxide measurements throughout the building ranged from 407 - 1036 ppm. Carbon dioxide levels exceeding 850 ppm were found on floors 8, 9, and 13.

Since there were no combustion sources in the building, carbon monoxide levels were as expected, between 0-1 ppm.

With regard to microbial sampling, indoor fungal levels were lower than those of outdoors and fungi detected indoors were similar to those detected outdoors. *Stachybotrys chartarum* was detected in one sample taken from the fitness center.

Based upon this limited scope investigation, DFOH recommends the following:

- 1) Results of this report should be considered with previous reports regarding the Fitness Center, and that action be taken to mitigate sources of microbial contamination and water incursion in that space.
- 2) The HVAC system on floors 8, 9, and 13 should be checked to ensure all components are properly operating, and that fresh air is adequately distributed to the space.

Introduction

At the request of the National Oceanic & Atmospheric Administration (NOAA), Federal Occupational Health (FOH) performed a limited scope indoor air quality investigation of Building SSMC-3, located at 1315 East-West Highway, Silver Spring, Maryland. The purpose of the investigation was to respond to ongoing employee concerns regarding indoor air quality by taking measurements of typical air quality parameters and comparing them to current industry standards. The investigation occurred over a three day period from February 29, through March 2, 2000. Evaluation methodologies and results are presented in the following report.

Evaluation Methods

Measurements of temperature, relative humidity, carbon monoxide, and carbon dioxide were taken in eight locations on each floor of the building as indicators of relative indoor air quality. All measurements were taken with TSI Q Trak IAQ monitor, model 8550/8551. Each floor was designated into two zones on either side of the elevator lobby. Four measurements were taken in each zone in randomly selected locations on the interior and exterior of the floor. Empty spaces were selected to control for overstated carbon dioxide levels resulting from occupants in the vicinity of the Q Trak.. A strategy was designed to completely sample one side of the building from top to bottom, then the other side from bottom to top. The strategy was designed to account for time of day variations in measurements, particularly carbon dioxide measurements which often increase over the workday.

Air samples for fungal contamination were collected by a culturable method using Andersen[®] N-6 samplers at a flow rate of 28.3 L/min. Indoor Andersen[®] air samples were collected for 3 minutes and outdoor samples were collected for both one and three minutes. Two percent (2 %) malt extract agar (MEA) was used to recover general fungi. All plates were incubated in a 25°C incubator. They were examined every other day for up to 10 days to ensure the full recovery of fungi. Fungal identification was based on colony morphology, spores and conidia formation. Total fungal colonies formed on each MEA plate were counted and recorded. Fungal levels in samples were presented as colony forming units (CFUs) per measuring unit.

All sample locations are marked on facility diagrams located in Attachment E.

Standards/Criteria

The IAQ Assessment followed general guidelines specified by the Environmental Protection Agency "Building Air Quality" Guide for Building Owners and Facility Managers, and the "Industrial Hygienist's Guide to Indoor Air Quality Investigations" published by the American Industrial Hygiene Association, Technical Committee on Indoor Environmental Quality.

ASHRAE Standard 55-1995 (Thermal Environmental Conditions for Human Occupancy) recommends temperatures in the range of 68-75⁰F in winter season and 73-79⁰F Summer season. These ranges are based on a 10% dissatisfaction criterion. The recommended relative humidity range is 30 - 60%.

Carbon monoxide levels should be 0-2 parts per million (ppm) above ambient, < 9 ppm average. Carbon Dioxide levels should remain < 850 ppm ("Industrial Hygienist's Guide to Indoor Air Quality Investigations" published by the American Industrial Hygiene Association, Technical Committee on Indoor Environmental Quality).

There are no “standards” for building microbial burden. Complaint areas are generally compared with non-complaint areas and outside air.

Results and Conclusions

Temperature, relative humidity, carbon dioxide, and carbon monoxide measurements by location are tabulated in Attachment A.

Microbial results are tabulated in Attachment B.

Temperatures throughout the building over the time period measured ranged from 66-77 ⁰F. . The fitness center was the only location with temperatures below 68⁰F. Indoor relative humidity ranged from 19-27%, except for the fitness center with relative humidity in the range of 28-37%.

Building temperatures were generally within the ASHRAE recommended range. Relative humidity was

consistently below 30%. Building humidity will likely increase during the spring and summer months. The building can be mechanically humidified to levels of 30-60%, however, this may not be advisable based upon building history and the presence of fungal spores.

Carbon dioxide measurements throughout the building ranged from 407 - 1036 ppm. Carbon dioxide levels as a function of time of day were graphed for each day of sampling to determine if levels increase over time. Graphs are located in Attachment C. Graphs show fluctuation in levels throughout the day, but no consistent pattern.

Carbon dioxide levels as a function of time were then graphed on a floor by floor basis. These graphs are located in Attachment D. The graphs of each floor indicate little variability in carbon dioxide levels over time, however, identified 3 floors with carbon dioxide levels exceeding 850 ppm. These floors are 8, 9, and 13.

Carbon monoxide levels throughout the facility were consistently 0-1 ppm.

Recommendations

Based upon this limited scope investigation, DFOH recommends the following:

- 1) Results of this report should be considered with previous reports regarding the Fitness Center, and that action be taken to mitigate sources of microbial contamination and water incursion in that space.

The HVAC system on floors 8, 9, and 13 should be checked to ensure all components are properly operating, and that fresh air is adequately distributed to the space.

Attachment A

IAQ Measurements

Attachment B

Microbial Sample Results

Attachment C

CO2 vs. Time Graphs

Attachment D

Floor by Floor

CO2 Vs. Time Graphs

Attachment E

Facility Diagrams